WATERFLUX 3070 Technical Datasheet

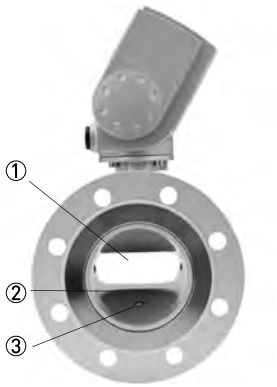
- Engineered and manufactured for the water and wastewater industry
- Highly accurate measurement with extremely short in- and outlet lengths
- Battery operated, stand alone water meter, battery life up to 15 years

KROHNE

1.1 The power of independence

The WATERFLUX 3070 is a battery powered electromagnetic water meter for standard applications in the water and wastewater industry. It has a very long battery life of up to 15 years, making it especially suitable for applications where no power connection is available. The WATERFLUX 3070 has been designed for custody transfer applications. It meets the requirements of the OIML R-49 and can be verified according to MI-001 for DN50...200.

The strength of the WATERFLUX lies in its unique flow sensor construction with a rectangular cross section. The coils are arranged so that a strong, homogeneous magnetic field is formed leading to an improved signal to noise ratio. The measurement is therefore independent of the flow profile and measurements are very stable. This results in a very good low flow performance and allows for very short inlet and outlet sections.



① Unique flow sensor design with rectangular cross-section
② Highly resistant Rilsan® coating
③ Built-in reference electrode

Highlights

- Low inaccuracy of ± 0.2% of measuring value + 0.5 mm/s
- Suitable for custody transfer according to OIML R-49 and MI-001
- Excellent performance in low flow conditions
- Bi-directional measurement
- Short inlet and outlet conditions of ≤ 3 DN and 1 DN
- Low energy consumption and self providing energy by internal batteries for 15 years
- Rilsan® polymer coating.
- Buriable sensor (IP 68), installation in chambers is not necessary
- Maintenance free operation, no moving parts, no wear and obstruction free
- Optional battery powered data logger / GSM module for remote data transfer
- Very attractive cost of ownership
- No grounding rings due to integrated reference electrode

Industries

- Revenue metering
- Water abstraction
- Distribution of potable water
- Irrigation

Applications

- Measurement of raw water, potable water, irrigation water
- Well chambers
- Monitoring of distribution networks
- Pipeline leak detection
- Measuring of water consumption

1.2 Options

GSM and data logger module: KGA 42
There is an increased demand by water utilities for remote reading of water meters. They are often installed at remote locations in the drinking water distribution networks or sites difficult to reach such as metering manholes below the ground. For all these applications the KROHNE KGA 42 data logger and GSM module offers an efficient wireless communication solution for the transmission of data. It fulfils most customer requirements as it is easy to install, waterproof (IP68), has a built-in dedicated antenna and operates on batteries. Connected with WATERFLUX 3070, KGA 42 sends out SMS reports on a daily basis or direct SMS alerts to maintenance personnel.

Remote version
The WATERFLUX is also available in a remote field version with buriable IP 68 sensor as WATERFLUX 3070 F.

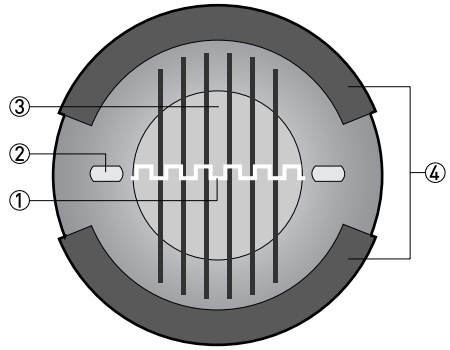
WATERFLUX as flowmeter
Where mains power is available, the WATERFLUX sensor can be combined with the economical IFC 100 signal converter or the fully featured IFC 300 signal converter.

1.3 Measuring principle

An electrically conductive fluid flows inside an electrically insulating pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage U is generated:
U = v * k * B * D

in which:
v = mean flow velocity
k = factor correcting for geometry
B = magnetic field strength
D = inner diameter of flow meter

The signal voltage U is picked off by electrodes and is proportional to the mean flow velocity v and thus the flow rate q. The signal voltage is quite small (typically 1 mV at v = 3 m/s / 10 ft/s and field coil power of 1 W). Finally, a signal converter is used to amplify the signal voltage, filter it (separate from noise) and convert it into signals for totalising, recording and output processing.



① Induced voltage (proportional to flow velocity)
② Electrodes
③ Magnetic field
④ Field coils

2.1 Technical data

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).*

Measuring system

Measuring principle	Faraday's law
Application range	Electrically conductive fluids
Measured value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

Design

Features	Unique rectangular flow tube design providing improved flow profile and signal to noise ratio resulting in highest accuracy, low energy consumption and large turndown ratio
	Rilsan polymer coated flow tube without internal or moving parts
	Built-in reference electrode with floating design
	Self providing energy by batteries for up to 15 years
Modular construction	The measurement system consists of a flow sensor and a signal converter. It is available as compact and as separate version.
Compact version	WATERFLUX 3070 C
Remote version	In field (F) mount version: WATERFLUX 3070 F
	Cable length up to 25 m / 75 ft
Nominal diameter	DN25...600 / 1...24"
Measurement range	-12...12 m/s / -40...40 ft/s
Starting flow	from 0 m/s / 0 ft/s onwards
User interface	
Display	8 digits LCD
	Display of positive and negative counter, sum counter, flow rate
	Status indication for battery, flow / counter direction, empty pipe
Units	Volume in m^3, US Gallons
	Flow rate in m^3/h, USGPM, l/s
Cable connnections	Standard: 2x M20x1.5
	Optional: ½" NPT, PF½

Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Inlet section: 5 DN
	Operating pressure: 1 bar / 14.5 psig
Maximum measuring error	MV = Measured value
	DN25...300: ±0.2% of MV ±0.5 mm/s / 0.06 inch/s
	DN350...600: ±0.2% of MV ±1.5 mm/s / 0.02 inch/s
	Optional: verification to MI-001 for DN50...200
	For detailed information on the measuring accuracy, see chapter "Measuring accuracy".
Repeatability	DN25...300: ±0.1%
	DN350...600: ±0.2%

Operating conditions

Temperature	
Process temperature	Rilsan liner: -5...+70°C / +23...+158°F
	Hard rubber liner: -5...+80°C / +23...+176°F
Ambient temperature	-40...+65°C / -40...+149°F
Storage temperature	-50...+70°C / -58...+158°F
Pressure	
Ambient pressure	Atmospheric
Nominal flange pressure	up to PN 16
EN 1092-1	DN200...600: PN 10
	DN25...200: PN 16
ISO insertion length	**Standard**
	DN50...200 / ASME 2...8"
	DN300 / ASME 12"
	DN400...600 / ASME 16...24"
	Option
	DN25...40 / ASME 1...1½"
	DN250 / ASME 10"
	DN350 / ASME 14"
ASME B16.5	150 lbs RF
Chemical properties	
Physical condition	Clean water
Electrical conductivity	≥ 20 µS/cm
Process conditions	Raw water, ground- and surface water
	Potable water
	Irrigation water

Installation conditions

Installation	Take care that flow sensor is always fully filled
	For detailed information see chapter "Installation"
Flow direction	Forward and reverse.
	Arrow on flow sensor indicates positive flow direction.
Inlet run	DN25...300: ≥ 3 DN
	DN350...600: ≥ 5 DN
Outlet run	DN25...300: ≥ 1 DN
	DN350...600: ≥ 2 DN
Dimensions and weights	For detailed information see chapter "Dimensions and weights".

Materials

Sensor housing	Sheet steel, polyurethane coated
	Option for DN350...600: Stainless steel
Measuring tube	DN25...200: Metallic alloy
	DN250...600: Stainless steel
Flanges	Standard: steel 1.0460 / 1.0038 (RSt37-2)
	Option for DN350...600: Stainless steel
Liner	DN25...300: Rilsan®
	DN350...600: Hard rubber
Connection box (remote versions only)	Standard: Die-cast aluminium, polyurethane coated
	Option: Stainless steel
Measuring electrodes	DN25...200: Stainless steel 1.4301 / AISI 304
	DN250...600: Hastelloy C22
Grounding electrode	Stainless steel 1.4301 / AISI 304 (only for DN25...200)
	Other materials on request
Grounding rings	DN25...300: not required
	Optional for DN350...600: Stainless steel rings
	Other materials on request
Signal converter housing	Die-cast aluminium, polyurethane coated

Process connections

EN 1092-1	DN25...600 in PN 10...16
ASME	1...24" in 150 lbs
JIS	DN350...600 in JIS 10 K / 20 K
Others	Threaded connections on request
	For information on available combinations of nominal flange pressure and nominal diameter see chapter "Dimensions and weights".

Electrical connections

Power supply	
Battery	**Standard**
	1 Lithium battery (D-cell)
	Optional
	2 Lithium batteries (D-cell)
	External battery pack with 4 lithium batteries (D-cell, IP68)
Typical lifetime	See graph at the end of this table.
Alarm	Pre-alarm at 10% of energy left
	Final alarm at 1% of energy left
Battery replacement	Possible without loss of totalizer data
In- and output	
Outputs	2 Passive pulse outputs for remote totalising: f ≤ 500 Hz; I ≤ 10 mA; U: 2.7...24 VDC (P ≤ 100 mW)
	2 Passive status outputs: I ≤ 10 mA; U: 2.7...24 VDC (P ≤ 100 mW)
Communication	Optional: external data logger / GSM module, SMS protocol to:
	SCADA system (at customer's site)
	OPC server (to be connected to customer's OPC client)
	PCWin (mini-SCADA can be supplied by KROHNE)

Approvals and certificates

CE	
	This device fulfills the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.
Electromagnetic compatibility	Directive: 2004/108/EC
	Harmonized standard: EN 61326-1: 2006
Low voltage directive	Directive: 2006/95/EC
	Harmonized standard: EN 61010: 2001
Pressure equipment directive	Directive: 97/23/EC
	Category I, II or SEP
	Fluid group 1
	Production module H
Other approvals and standards	
Custody transfer	Standard: without verification
	MI-001 type examination certificate for DN50...200, pending for other diameters
	OIML R-49 certificate of conformity for DN50...200, pending for other diameters
	Conform EN 14154 / ISO 4064
Drinking water approvals	DN25...300: ACS (DVGW, KTW, NSF, WRc pending)
	DN350...600: ACS, DVGW, NSF (KTW, WRc pending)
Protection category acc. to IEC 529 / EN 60529	**Standard**
	IP 66/67 (NEMA 4/4X/6)
	Optional (F version sensor only)
	IP 68 field (NEMA 6P)
	IP 68 factory (NEMA 6P)
	IP 68 is only available with a stainless steel connection box.
Shock- and vibration resistance	IEC 68-2-3

Typical lifetime of batteries (at 25°C) for a DN80

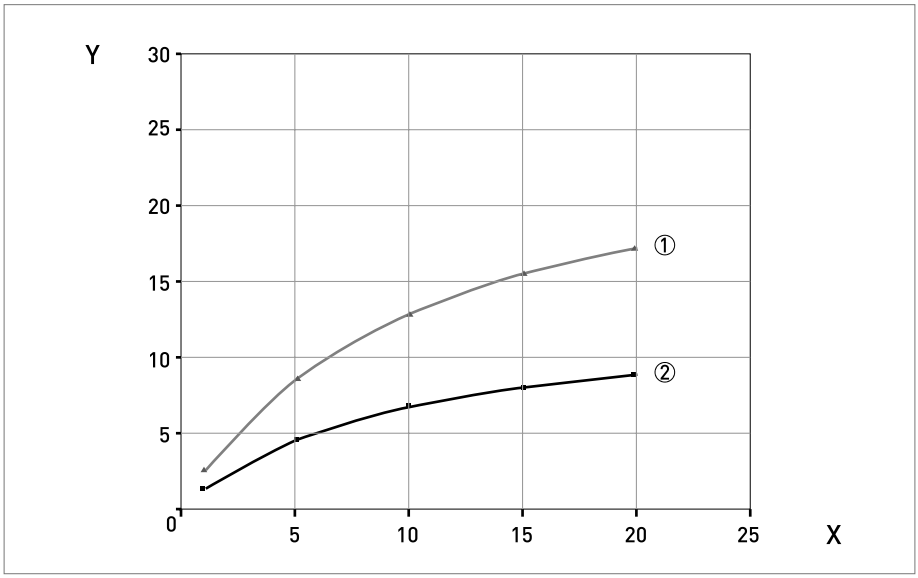


Figure 2-1: **X** = Sampling interval in seconds, **Y** = typical lifetime in years

① dual battery pack
② single battery

2.2 Pressure loss

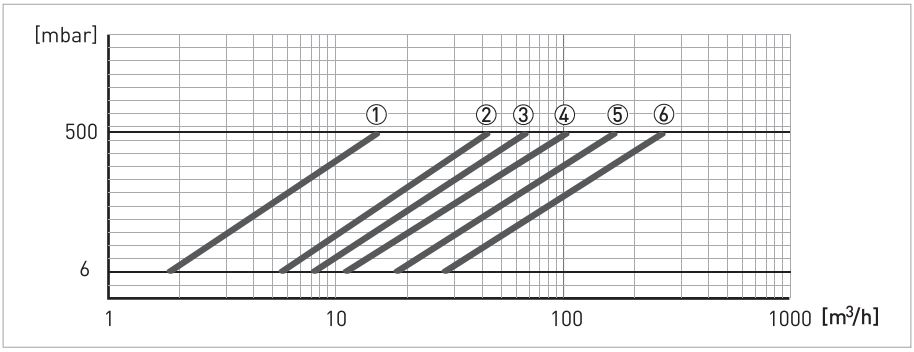


Figure 2-2: Pressure loss between 1 m/s and 9 m/s for DN25...100

① DN25
② DN40
③ DN50
④ DN65
⑤ DN80
⑥ DN100

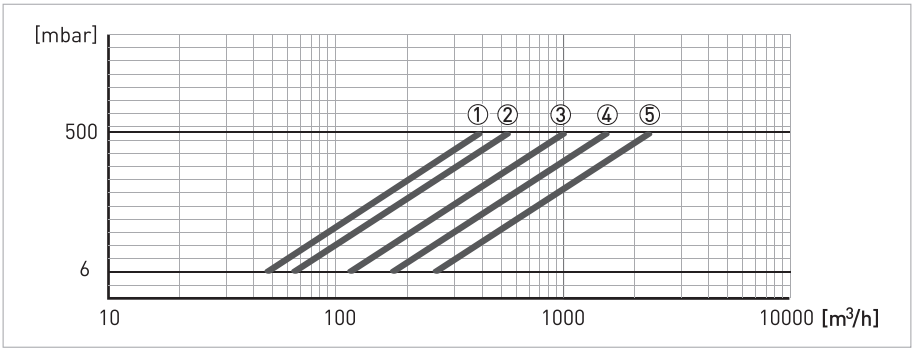


Figure 2-3: Pressure loss between 1 m/s and 9 m/s for DN125...300

① DN125
② DN150
③ DN200
④ DN250
⑤ DN300

Diameters DN350...600 have a neglectible pressure loss.

2.3 Measuring accuracy

Accuracy and reproducibility are important characteristics of a watermeter. Each single watermeter is standard wet calibrated by direct volume comparison at KROHNE's certified calibration facilities before leaving the factory. The performance of the watermeter is defined and documented in an individual watermeter calibration certificate.

Standard situation with 3DN inlet and 1DN outlet

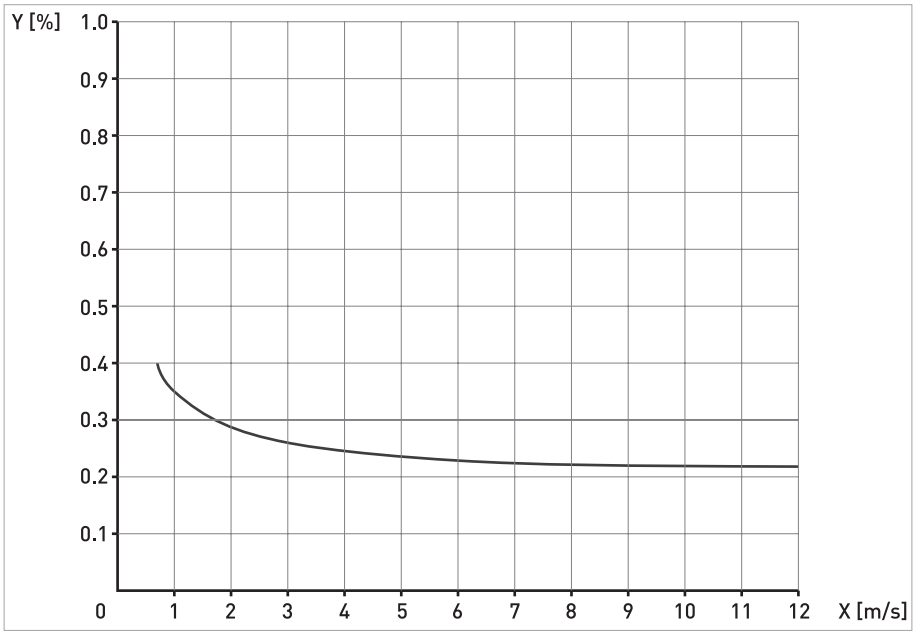


Figure 2-4: **X** = flow velocity [m/s]; **Y** = deviation [%]

DN25...300: If the inlet or outlet section is shorter than respectively 3 DN / 1 DN, the above curve should be raised with 0.5%.
DN350...600: If the inlet or outlet section is shorter than respectively 5 DN / 2 DN, the above curve should be raised with 0.5%.

2.4 OIML R-49

WATERFLUX complies with the international recommendation OIML R-49 and the European directive MI-001. OIML R-49 recommendation (2006) concerns water meters intended for the metering of cold potable water and hot water. WATERFLUX 3070 has a certificate of compliance with OIML R-49, issued by NMi.
The OIML R-49 recommendation sets out the conditions to which water meters shall comply to meet the requirements of the services of legal metrology in countries where these instruments are subject to state controls.
The measuring range of the water meter is determined by Q3 (nominal flow rate) and "R" (ratio). WATERFLUX 3070 meets the requirements for water meters of accuracy class 1 and accuracy class 2.
For accuracy class 1, the maximum permissible error for water meters is ±1% for the upper flow rate zone and ±3% for the lower flow rate zones.
For accuracy class 2, the maximum permissible error for water meters is ±2% for the upper flow rate zone and ±5% for the lower flow rate zones.

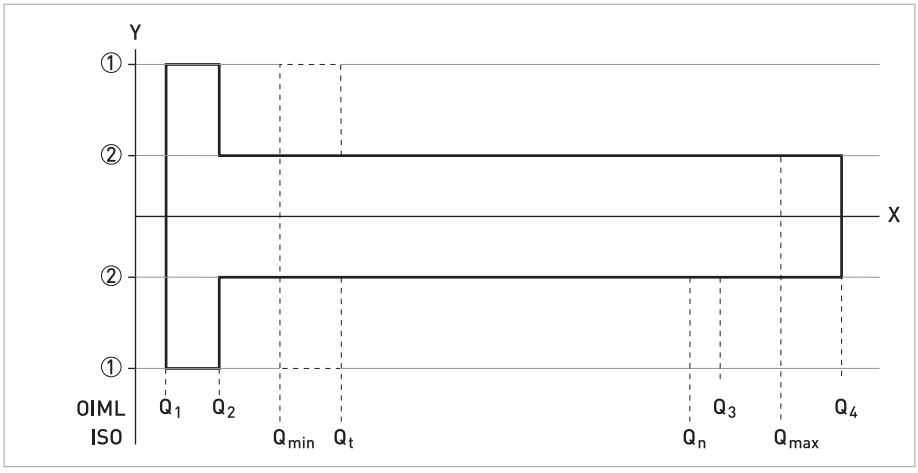


Figure 2-5: **X:** Flow rate; **Y:** Maximum measuring error [%]

① ±3% for class 1, ±5% for class 2 devices
② ±1% for class 1, ±2% for class 2 devices

Q1 = Q3 / R
Q2 = Q1 * 1,6
Q3 = Q1 * R
Q4 = Q3 * 1,25

OIML R-49 Class 1

DN	Span (R)	Flow rate [m^3/h]			
		Minimum Q1	Transitional Q2	Permanent Q3	Overload Q4
65	400	0.40	0.64	100	125
80	160	0.63	1.00	100	125
80	250	0.64	1.02	160	200
100	160	1.0	1.6	160	200
100	250	1.0	1.6	250	312.5
125	160	1.56	2.50	250	312.5
125	250	1.60	2.56	400	500
150	160	2.50	4.00	400	500
150	250	2.52	4.03	630	787.5
200	160	3.94	6.30	630	787.5

OIML R-49 Class 2

DN	Span (R)	Flow rate [m^3/h]			
		Minimum Q1	Transitional Q2	Permanent Q3	Overload Q4
50	400	0.100	0.160	40	50
50	400	0.158	0.252	63	78.75
65	400	0.160	0.25	63	78.80
65	400	0.25	0.40	100	125
80	400	0.25	0.40	100	125
80	400	0.40	0.64	160	200
100	400	0.40	0.64	160	200
100	400	0.63	1.00	250	312.5
125	400	0.63	1.00	250	312.5
125	400	1.00	1.60	400	500
150	400	1.00	1.60	400	500
150	400	1.58	2.52	630	787.5
200	400	1.58	2.52	630	787.5

2.5 MI-001

All new designs of water meters that are to be used for legal purposes in Europe require certification under the Measuring Instruments Directive (MID) 2004/22/EC. Annex MI-001 of the MID Directive applies to: Water meters intended for the measurement of volume of clean, cold or heated water in residential, commercial and light industrial use. A Type Examination Certificate to the MID certificate is valid in all the countries of the European Union.
WATERFLUX 3070 has a Type Examination Certificate to the MID MI-001 for DN50...200 (other sizes pending).
The EC Type Examination certificate for WATERFLUX 3070 is valid for the compact and the remote version and applies for forward and reverse flow.
According to MI-001 the maximum permissible error on volumes delivered between Q2 (transitional) flow rate and Q4 (overload) flow rate is ±2%. The maximum permissible error on volumes delivered between Q1 (minimum) flow rate and Q2 (transitional) flow rate is ±5%.
WATERFLUX 3070 with a verification to MID will be standardly calibrated on Q1, Q2 and Q3 as specified in the table below. Different values for the permanent flow rate Q3 and R (up to 400) are possible on request.

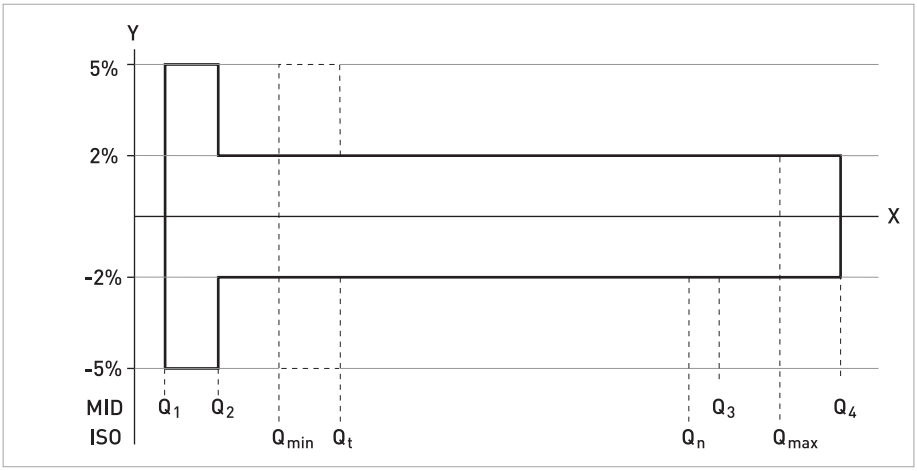
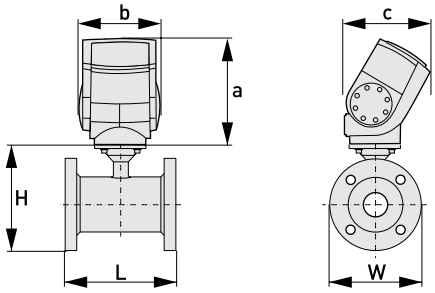
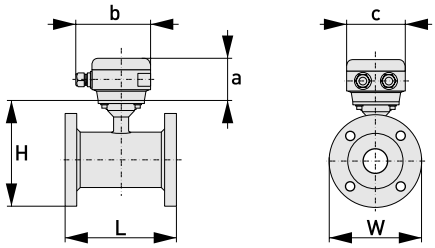
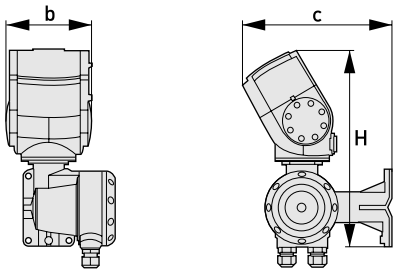


Figure 2-6: **X:** Flow rate; **Y:** Maximum measuring error [%]

MI-001

DN	Span (R)	Flow rate [m^3/h]			
		Minimum Q1	Transitional Q2	Permanent Q3	Overload Q4
50	80	0.5	0.8	40	50
65	80	0.788	1.26	63	78.75
80	80	1.25	2	100	125
100	80	2	3.2	160	200
125	80	3.125	5	250	312.5
150	80	5	8	400	500
200	80	7.875	12.6	630	787.5

2.6 Dimensions and weights

Compact version	
	a = 170 mm / 6.7" b = 132 mm / 5.2" c = 140 mm / 5.5" Total height = H + a
Remote version, sensor	
	a = 77 mm / 3.1" b = 139 mm / 5.5" c = 106 mm / 4.2" Total height = H + a
Remote version, signal converter	
	b = 132 mm / 5.2" c = 235 mm / 9.3" H = 310 mm / 12.2" Weight = 3.3 kg / 7.3"

Dimensions and weights [metric]

Flanges acc. EN 1092-1		Dimensions [mm]			Approx. weight [kg]
DN	PN	L	H	W	
25	16	150	150.5	115	5
40	16	150	165.5	150	5.7
50	16	200	186	165	13
65	16	200	200	185	11
80	16	200	209	200	17
100	16	250	237	220	17
125	16	250	266	250	21
150	16	300	300	285	29
200	10	350	361	340	36
250	10	400	408	395	50
300	10	500	458	445	60
350	10	500	510	505	80
400	10	600	568	565	103
450	10	600	618	615	113
500	10	600	671	670	132
600	10	600	781	780	167

Dimensions and weights [imperial]

Flanges acc. ASME B16.5		Dimensions for 150 lbs flanges [inches]			Approx. weight [lbs]
DN	PN	L	H	W	
1	150	5.91	5.83	4.33	18
1½	150	5.91	6	4.92	21
2	150	7.87	7.05	5.98	34
3	150	7.87	8.03	7.50	42
4	150	9.84	9.49	9.00	56
5	150	9.84	10.55	10.00	65
6	150	11.81	11.69	11.00	80
8	150	13.78	14.25	13.50	100
10	150	15.75	16.30	16.00	148
12	150	19.69	18.78	19.00	212
14	150	27.56	20.67	21.00	289
16	150	31.50	22.95	23.50	369
18	150	31.50	24.72	25.00	415
20	150	31.50	26.97	27.50	497
24	150	31.50	31.38	32.00	680

3.1 Notes on installation

Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

Check the packing list to check if you received completely all that you ordered.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Inlet and outlet

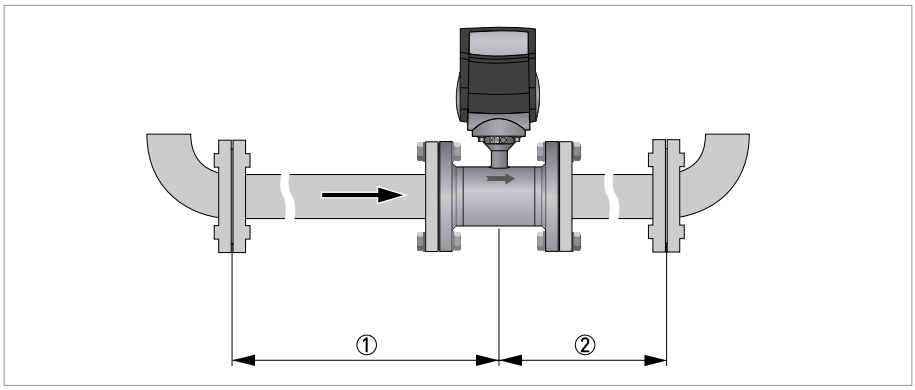


Figure 3-1: Recommended inlet and outlet

① ≥ 3 DN for DN25...300
≥ 5 DN for DN350...600
② ≥ 1 DN for DN25...300
≥ 2 DN for DN350...600

3.3 Mounting position and flange deviation

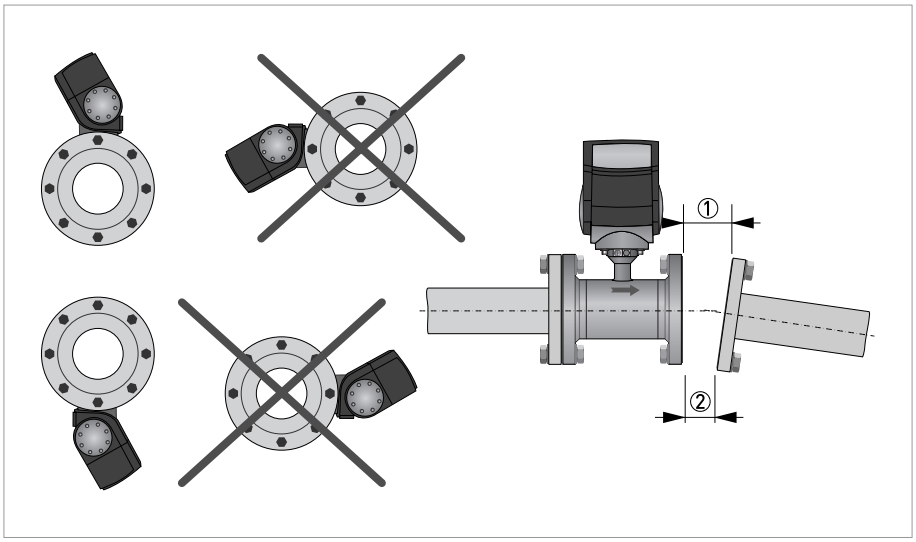


Figure 3-2: Mounting position and flange deviation

① L_{max}
② L_{min}

- Mount sensor either with converter aligned upwards or downwards.
- Install sensor in line with the pipe axis.
- Pipe flange faces must be parallel to each other.

Max. permissible deviation of pipe flange faces: L_{max} - L_{min} ≤ 0.5 mm

3.4 T-section

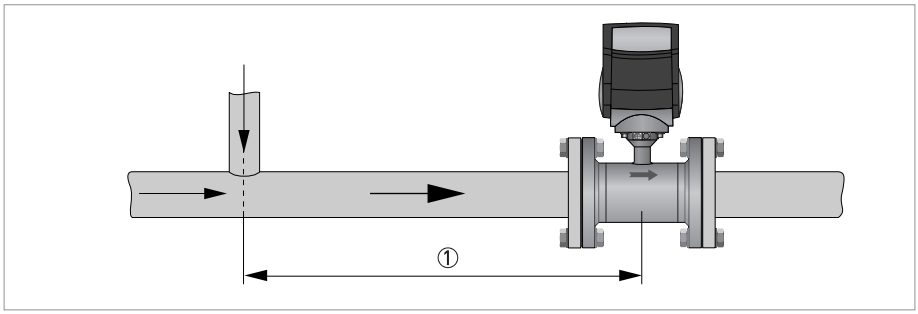


Figure 3-3: Distance after T-sections

DN25...300: ≥ 3 DN
DN350...600: ≥ 10 DN

3.5 Vibration

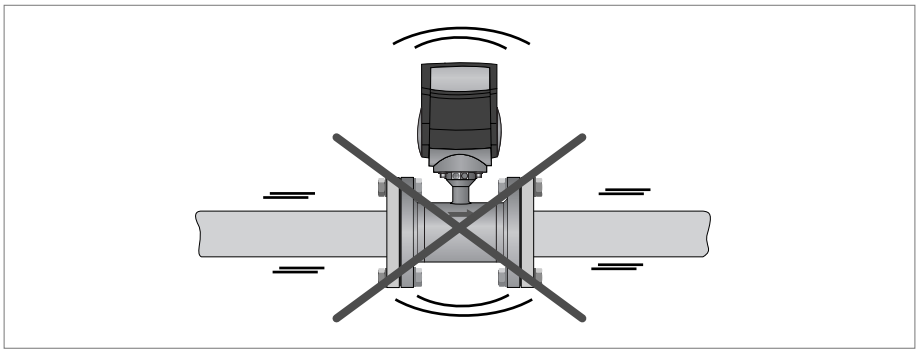


Figure 3-4: Avoid vibrations

3.6 Magnetic field

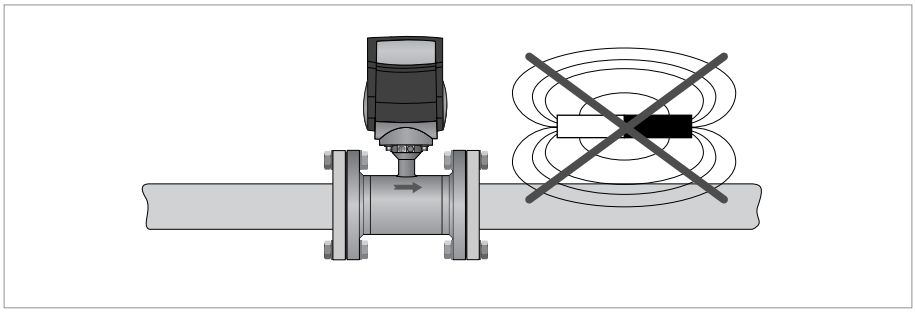


Figure 3-5: Avoid magnetic fields

3.7 Open discharge

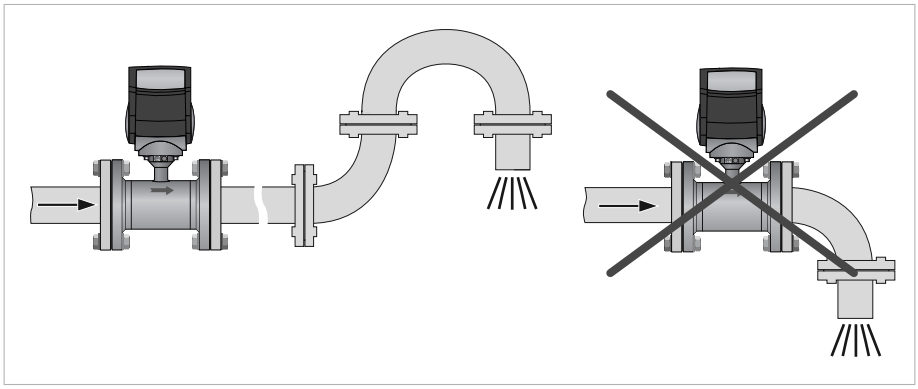


Figure 3-6: Installation before an open discharge

3.8 Bends

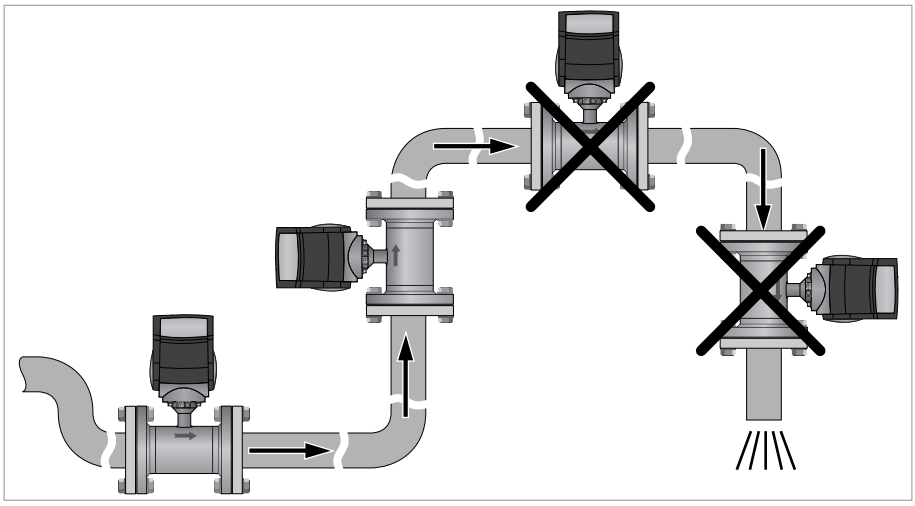


Figure 3-7: Installation in bending pipes

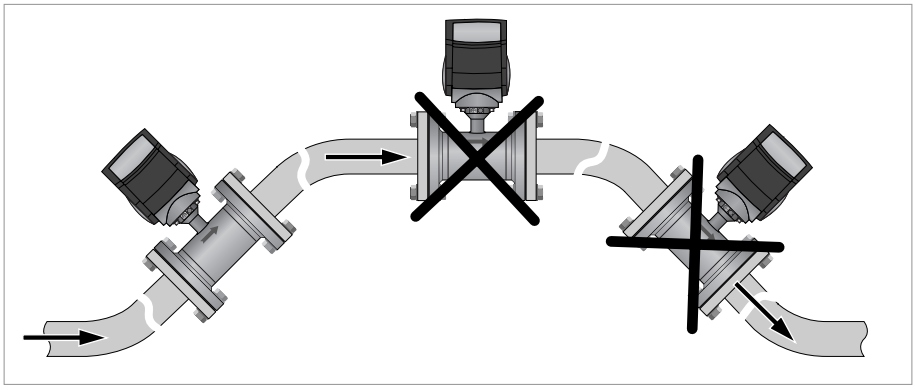


Figure 3-8: Installation in bending pipes

3.9 Control valve

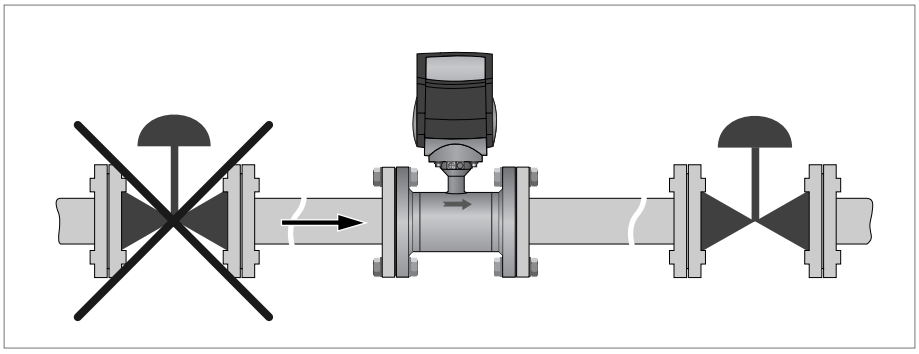


Figure 3-9: Installation before control valve

3.10 Air venting

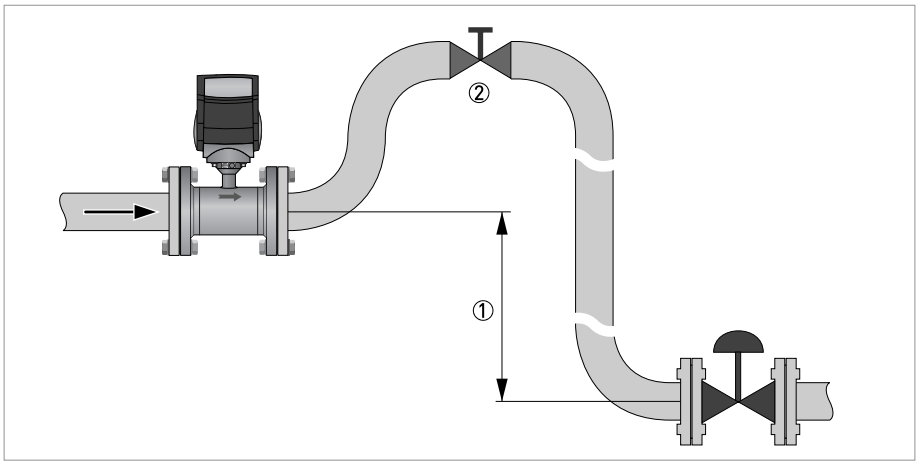


Figure 3-10: Air venting

① ≥ 5 m
② Air ventilation point

3.11 Pump

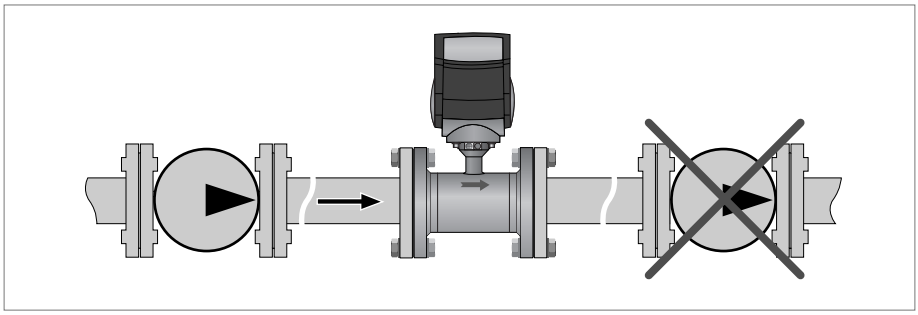


Figure 3-11: Installation after pump

3.12 IP68 mounting

IP68 versions are only available as remote version (F housing). You can put the sensor either into earth (buriable, with extra coating) or under water (submergible, stainless steel connection box).

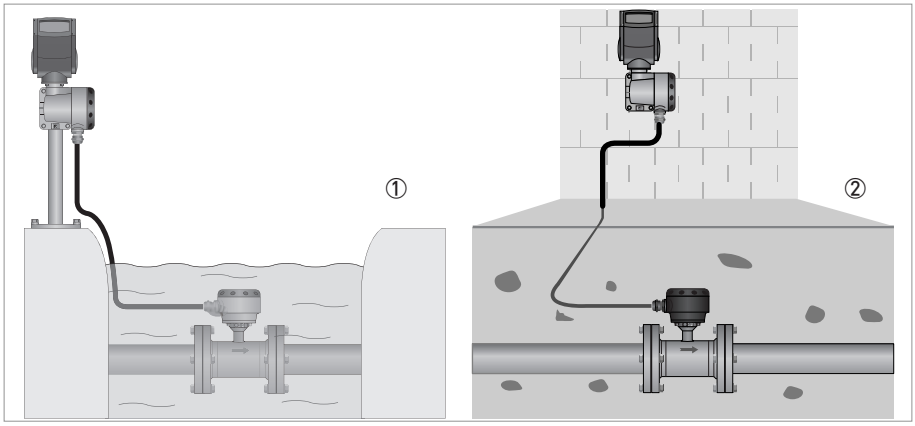


Figure 3-12: IP68 versions

① Submergible
② Buried

4.1 Safety instructions

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Installation of converter

Only applicable for remote versions.

- Mount converter with mounting plate on wall or standpipe.
- Keep distance between sensor and signal converter as short as possible.
- Observe length of the delivered signal cable.

4.3 Grounding

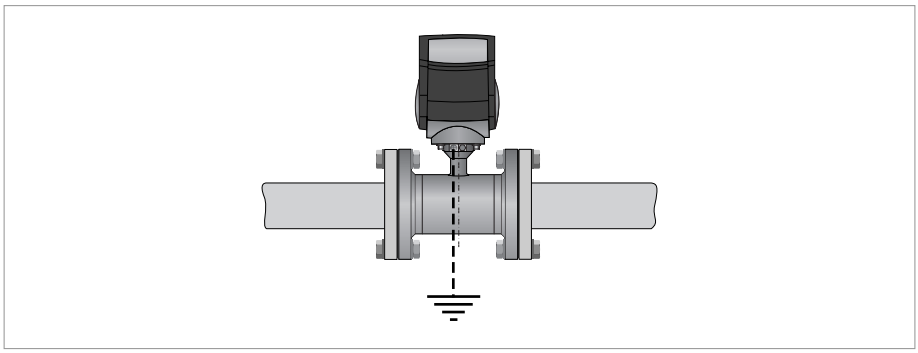


Figure 4-1: Grounding

- *DN25..300: the flow sensor is equipped with a reference electrode. Grounding rings are not necessary!*
- *DN350...600: Apply grounding rings if required.*

4.4 Connection of signal cable

The signal cable is only used with remote versions. The standard KROHNE WSC-cable includes both electrode and field current leads.

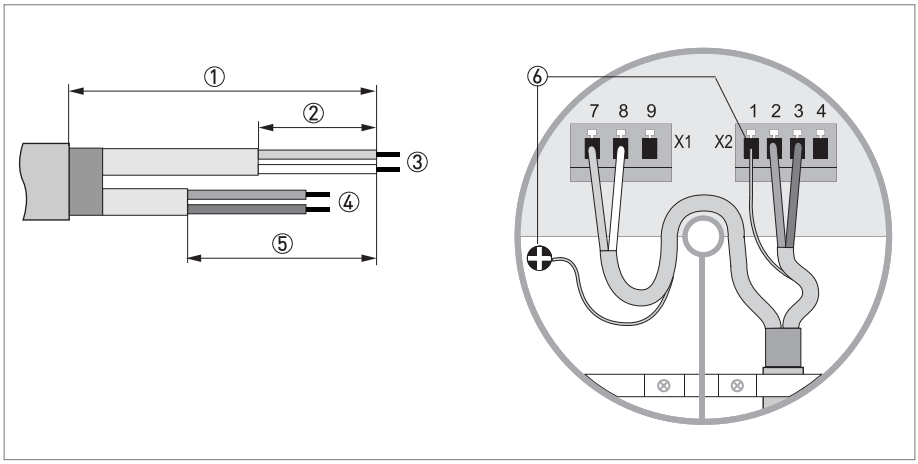


Figure 4-2: Cable connection at sensor side, standard cable

① cable length: 13 cm / 5"
② cable length: 5 cm / 2"
③ brown + white cable, used for field current
④ purple and blue cable, used for electrode signals
⑤ cable length: 8 cm / 3"
⑥ Shield (terminal 1 of connector X2 + U-clamp

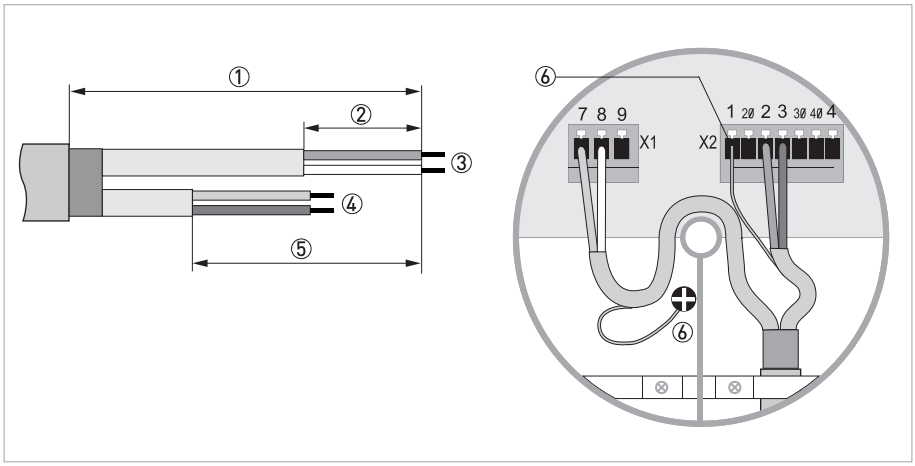


Figure 4-3: Cable connection at converter side, standard cable

① cable length: 13 cm / 5"
② cable length: 5 cm / 2"
③ brown + white cable, used for field current
④ purple and blue cable, used for electrode signals
⑤ cable length: 8 cm / 3"
⑥ Shield (terminal 1 of connector X2 + U-clamp

- Prepare appropriate cable lengths (①...③)
- Connect the shield to the U-clamp, the brown cable to terminal 7 and the white to terminal 8.
- Connect the shield to terminal 1, the purple cable (white in case of type A or B cable) to terminal 2 and the blue (red in case of type A or B cable) to terminal 3.

4.5 Terminal assignment of converter

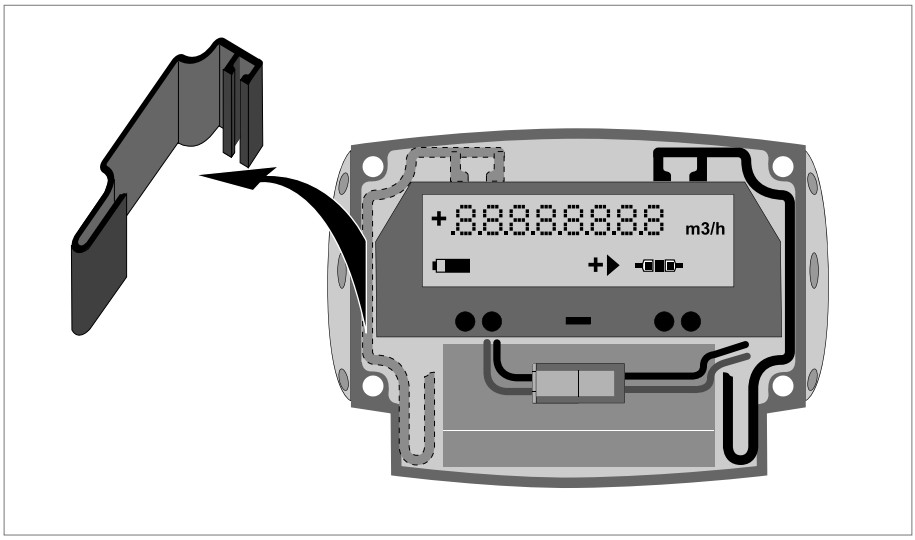


Figure 4-4: Removing side cap

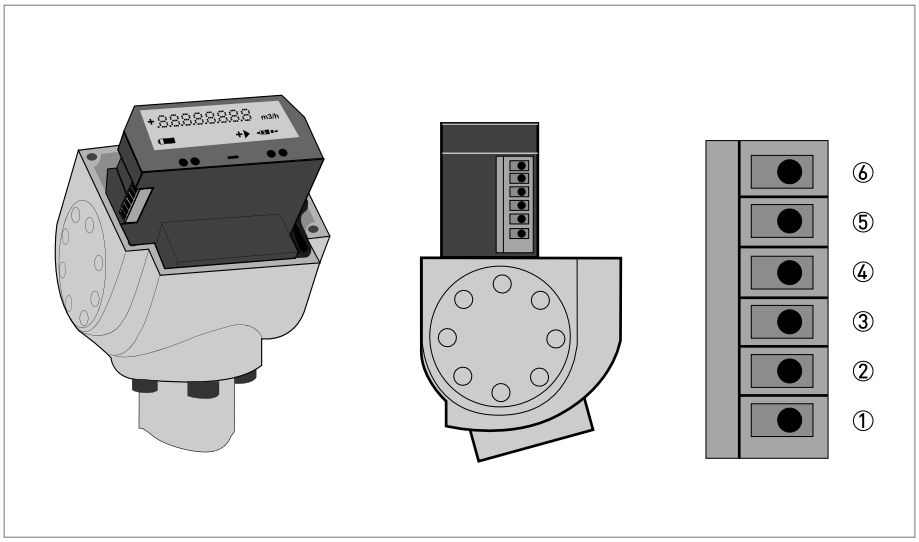
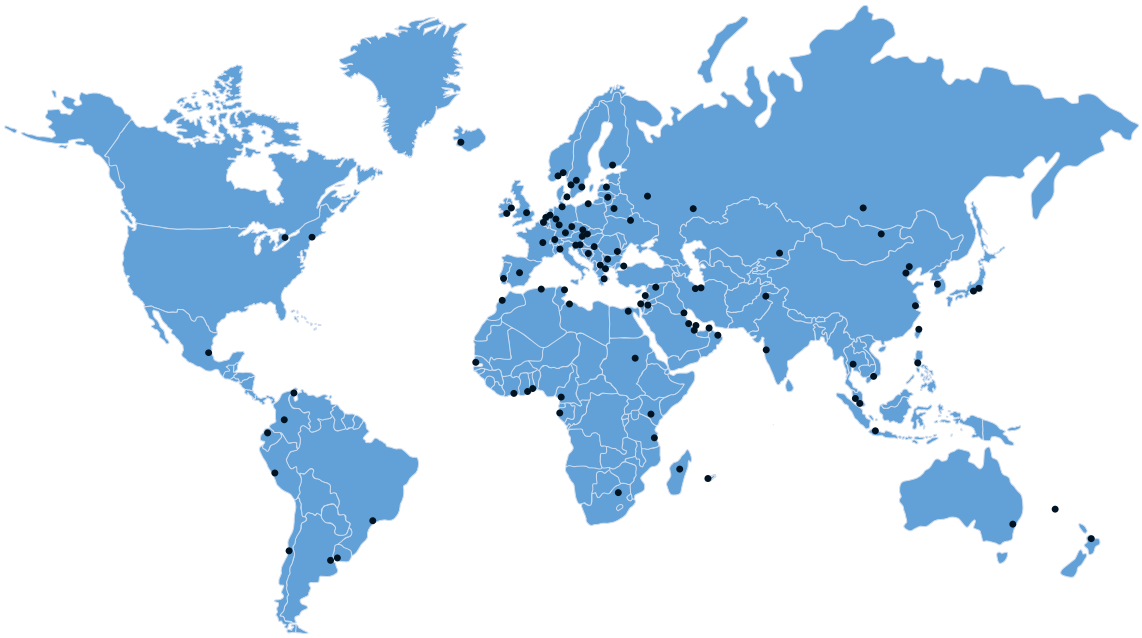


Figure 4-5: Terminal assignment

① Status output 1
② Status output 2
③ Not connected
④ Ground
⑤ Pulse output A
⑥ Pulse output B

Electrical values

- **Pulse output passive:**
  f ≤ 500 Hz; I ≤ 10 mA; U: 2.7...24 VDC (P ≤ 100 mW)
- **Status output passive:**
  I ≤ 10 mA; U: 2.7...24 VDC (P ≤ 100 mW)



KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Measuring systems for the oil and gas industry
- Measuring systems for sea-going tankers

Head Office KROHNE Messtechnik GmbH
Ludwig-Krohne-Str. 5
D-47058 Duisburg (Germany)
Tel.:+49 (0)203 301 0
Fax:+49 (0)203 301 10389
info@krohne.de

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com

KROHNE